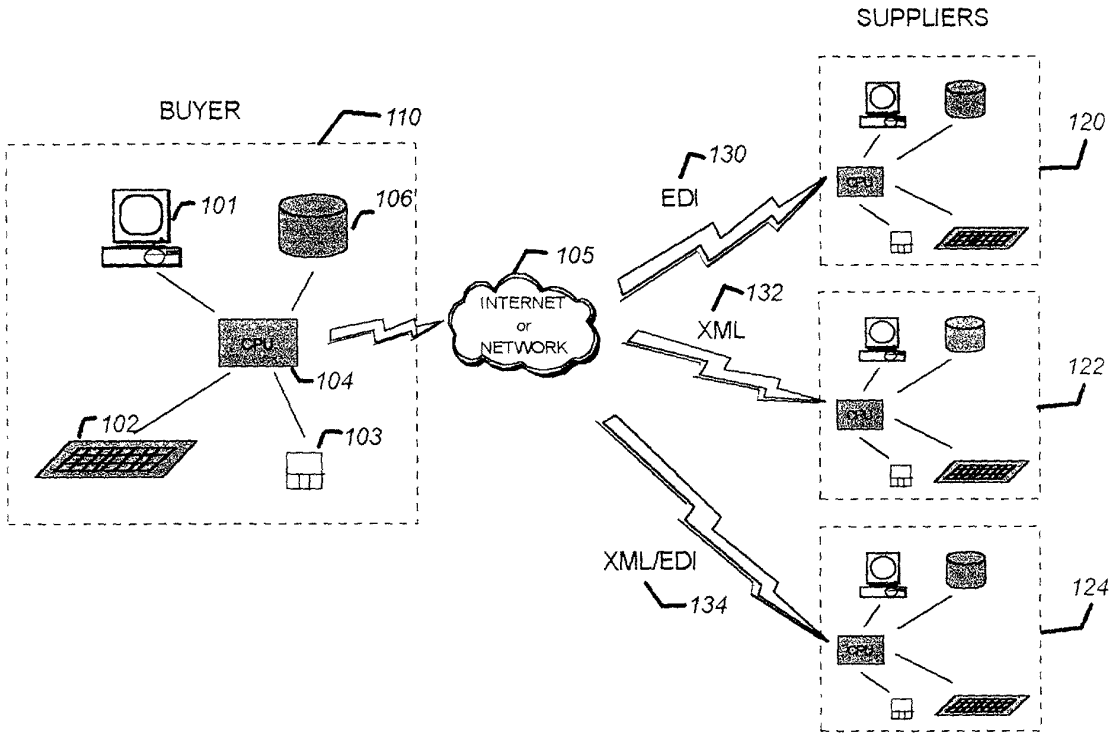


FIG. 1

Doc 1 of 1, Page 1 of 1

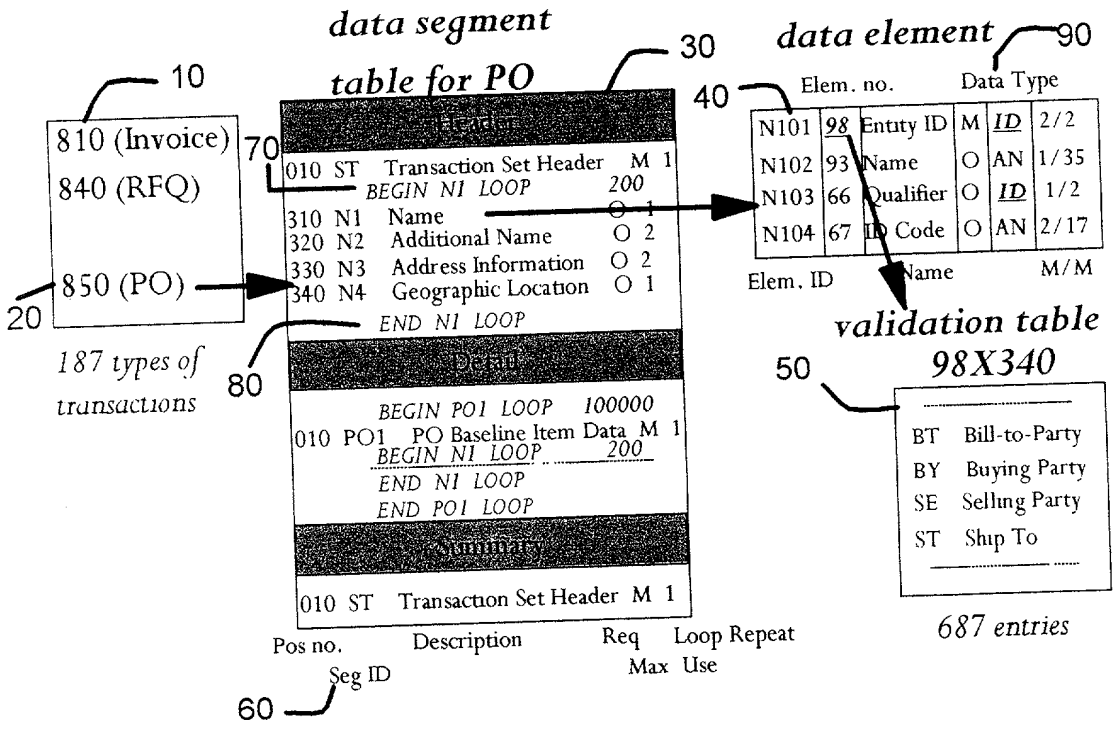
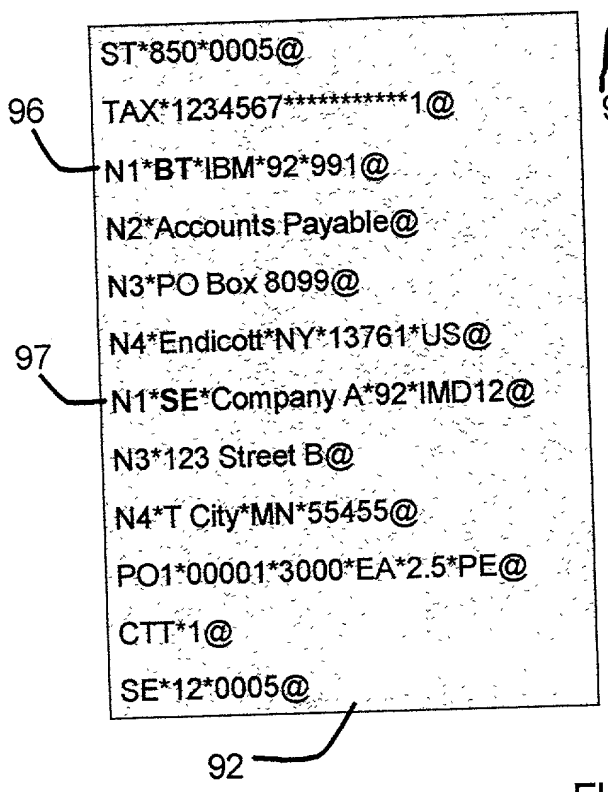

data segment
table for PO
30
data element
90
10
810 (Invoice)
840 (RFQ)
850 (PO)
20
187 types of transactions
70
80
Header
010 ST Transaction Set Header M 1
BEGIN N1 LOOP 200
310 N1 Name O 1
320 N2 Additional Name O 2
330 N3 Address Information O 2
340 N4 Geographic Location O 1
END N1 LOOP
Detail
BEGIN PO1 LOOP 100000
010 PO1 PO Baseline Item Data M 1
BEGIN N1 LOOP 200
END N1 LOOP
END PO1 LOOP
Summary
010 ST Transaction Set Header M 1
Pos no.
Seg ID
Description
Req
Max Use
Loop Repeat
60
40
Elem. no.
Data Type
N101 98 Entity ID M ID 2/2
N102 93 Name O AN 1/35
N103 66 Qualifier O ID 1/2
N104 67 ID Code O AN 2/17
Elem. ID
Name
M/M
validation table
98X340
50
BT Bill-to-Party
BY Buying Party
SE Selling Party
ST Ship To
687 entries

FIG. 2A



Data Segment Name

93 TAX: Tax Reference
N1: Name
95 N2: Additional Name
N3: Address Info
N4: Geographic Location
PO1: Base Line Item
CTT: Transaction Totals

Data Element Name

94 BT: Bill-To Party
SE: Selling Party

FIG. 2B

EDI-FACT-0012-2000

```
<!DOCTYPE transactionSet [                                    200
<!ELEMENT transactionSet (name, (loop|segment)* ) >
<!ATTLIST transactionSet
        code CDATA #REQUIRED
        version CDATA #REQUIRED
        standard (X12| EDIFACT) "X12"
>
                                                              210
<!ELEMENT loop (( loop | segment)* ) >
<!ATTLIST loop
        code CDATA #REQUIRED
>
                                                              220
<!ELEMENT segment (name, element*) >
<!ATTLIST segment
        code CDATA #REQUIRED
>
                                                              230
<!ELEMENT element (name, value) >
<!ATTLIST element
        code CDATA #REQUIRED
>
                                                              240
<!ELEMENT name (#PCDATA) >
                                                              250
<!ELEMENT value (#PCDATA) >
<!ATTLIST value
        code CDATA #IMPLIED
>
]>
```

FIG. 2C

FA2742-0450

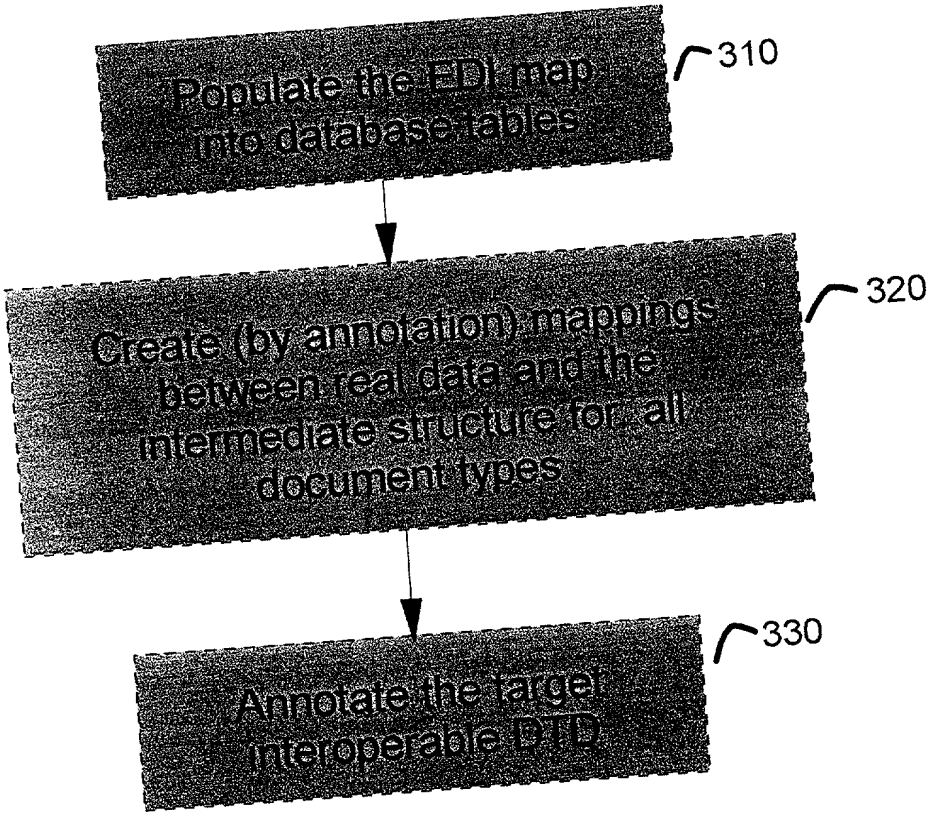

Populate the EDI map into database tables
310
Create (by annotation) mappings between real data and the intermediate structure for all document types
320
Annotate the target interoperable DTD
330

FIG. 3

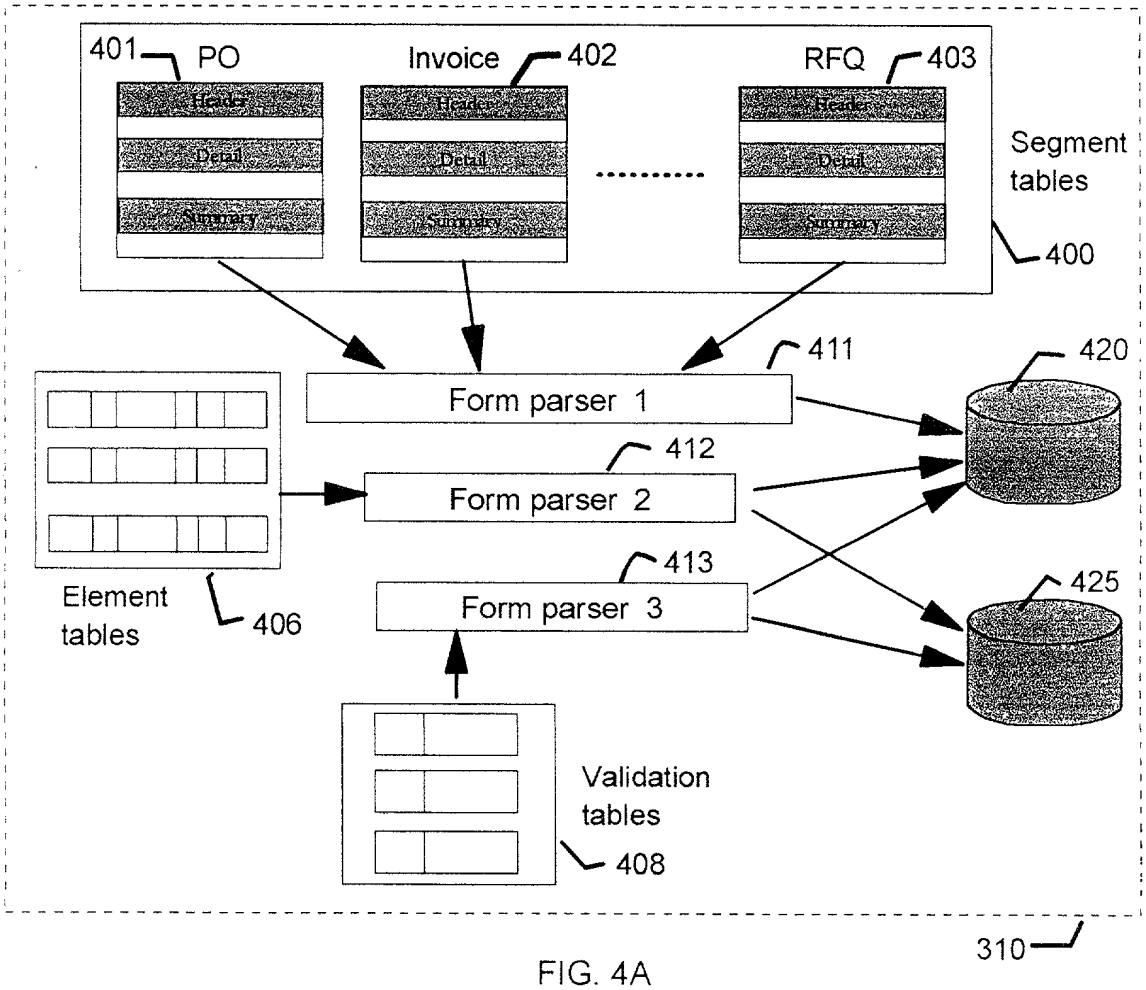

401
PO
Header
Detail
Summary
Invoice
402
Header
Detail
Summary
RFQ
403
Header
Detail
Summary
Segment tables
400
411
Form parser 1
412
Form parser 2
413
Form parser 3
420
425
Element tables
406
Validation tables
408
310

FIG. 4A

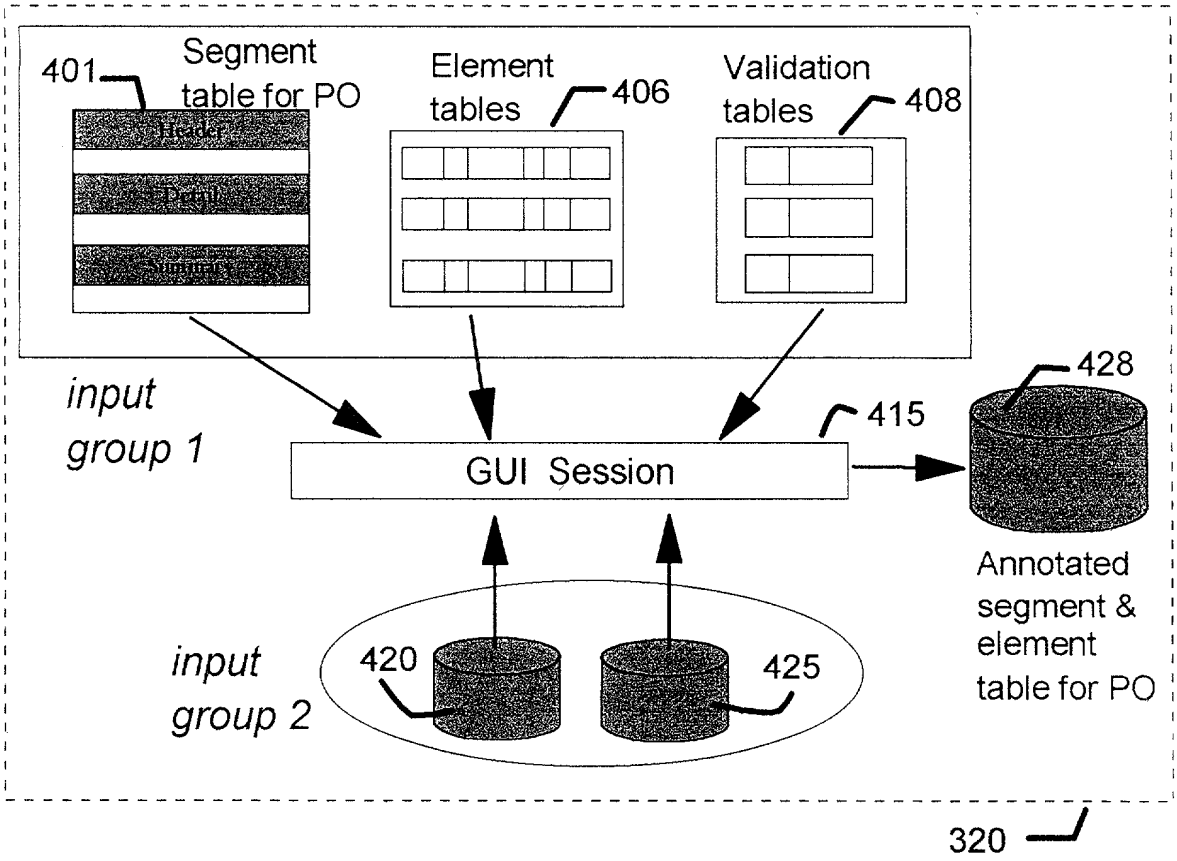

401
Segment
table for PO
Header
Detail
Summary
Element
tables
406
Validation
tables
408
input
group 1
GUI Session
415
428
Annotated
segment &
element
table for PO
input
group 2
420
425
320

FIG. 4B

```
<!DOCTYPE transactionSet [
<!ELEMENT transactionSet (name:: w:=<getDocumentType(in1)>,
                (loop::p:=<x.code>|segment::p:=<x.code>) :x.choice *
                ::x:=SQL("SELECT * FROM EDI WHERE map='$in1' ORDER BY pos") ) > :: dummy:=<initValue(in0)>
<!ATTLIST transactionSet
        code CDATA #REQUIRED · getDocumentNumber(in1)
        version CDATA #REQUIRED :"004010"
        standard (X12| EDIFACT) "X12"
>
<!ELEMENT loop (( loop::p:=<concat(p, "@", x.code)> |
                segment·.p:=<concat(p, "@", x.code)> ) : x.choice *
                ·:x:=SQL("SELECT * FROM EDI WHERE map='$x.code' ORDER BY pos") ) >
<!ATTLIST loop
        code CDATA #REQUIRED · x.name
>
<!ELEMENT segment (name:: w:=<x.name>,
                        element* :: y:=row(EDI, <map>, <x.code>) ) >
<!ATTLIST segment
        code CDATA #REQUIRED : x.code
>
<!ELEMENT element (name:: w:=<y.name>, value) >
<!ATTLIST element
        code CDATA #REQUIRED : y.code
>
<!ELEMENT name (#PCDATA  w ) >
<!ELEMENT value (#PCDATA : value4Element(val, y.code, y.type) ) >
                :: val:=<getEDIValue(y.code, p)>
<!ATTLIST value
        code CDATA #IMPLIED · id4Element(val, y.type)
>
]>
```

450, 460, 456, 458, 459, 451, 457, 452, 453, 454, 455, 474, 470, 472, 430

FIG. 4C

500 MAP	502 CODE	504 POS	506 CHOICE	508 TYPE	510 NAME
TS850	ST	0010	segment		Transaction Set Header
TS850	BEG	0020	segment		Beginning Segment for PO
TS850	REF	0050	segment		Reference Numbers
TS850	LOOP_N1	0301	loop		N1
TS850	LOOP_PO 1	1010	loop		PO1
TS850	CTT	2010	segment		Transaction Totals
TS850	SE	2030	segment		Transaction Set Trailer
LOOP_N1	N1	0310	segment		Name
LOOP_N1	N2	0320	segment		Additional Name Information
LOOP_N1	N3	0330	segment		Address Information
LOOP_N1	N4	0340	segment		Geographic Location
LOOP_PO 1	PO1	1010	segment		Baseline Item Data
LOOP_PO 1	LOOP_PID	1050	loop		PID
LOOP_PID	PID	1050	segment		Product/Item Description
ST	143		element	ID	Transaction Set ID Code
ST	329		element	A N	Transaction Set Control Number
N1	98		element	ID	Entity Identifier Code
N1	93		element	A N	Name
N1	66		element	ID	ID Code Qualifier
N1	67		element	A N	ID Code

420

515

516

517

518

FIG. 5A

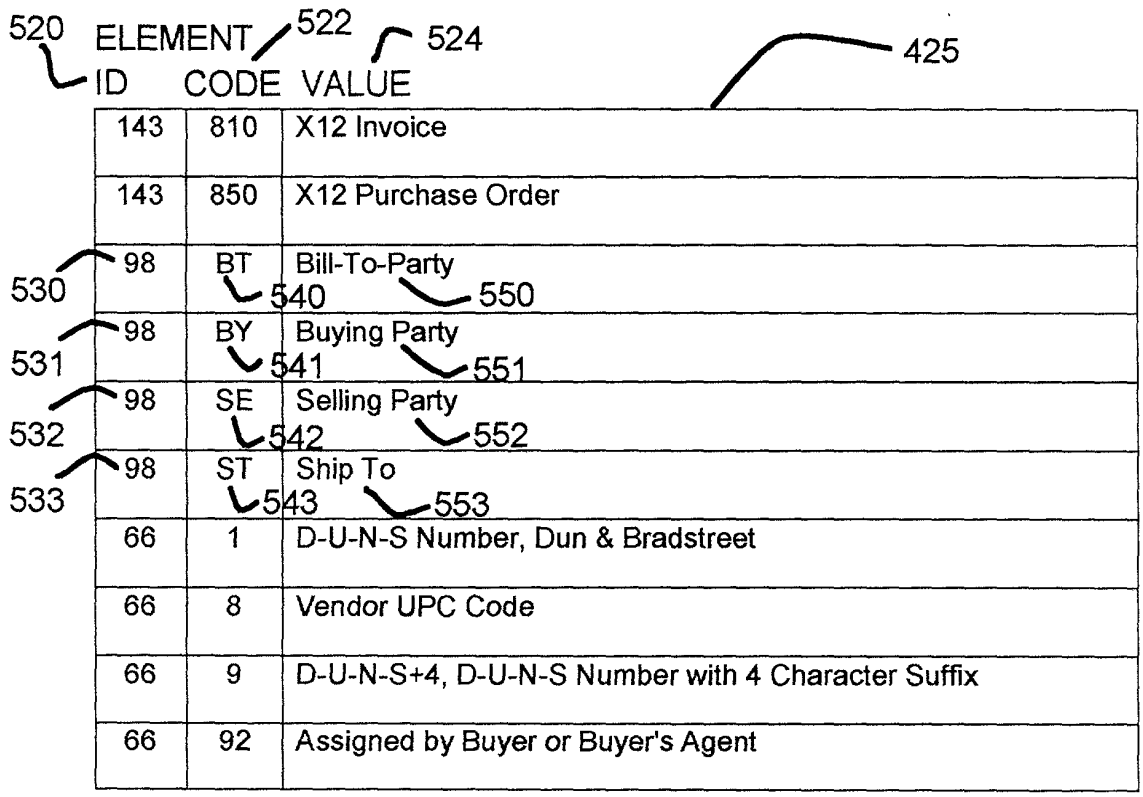


FIG. 5B

Oracle Ex. 2040, p. 15

level (610)	segment element/code (600)	repeat (602)	annotation (604)	description (606)	label (608)
1	ST		x:=row(PO,poid,in0)	Transaction Set Header (650)	ST (653)
2	ST01/143		"850" (628)	ID Code (651)	ST@143
2	ST02/329		in0	Control Number (652)	ST@329
1 (620)	LOOP_N1	*	y:=row(company,coid, x.buyer)	N1/BUYER	LOOP_N1
2	N1		(621) (630)	Name	LOOP_N1@N1
3	N101/98		"BY"	Entity ID	LOOP_N1@N1@98
3	N102/93		y.name	Name	LOOP_N1@N1@93
2	N4		(629)	Geographic Location	LOOP_N1@N4
3	N402/156		y.addr	State	LOOP_N1@N4@156
1 (622)	LOOP_N1	*	y:=row(company,coid,x.seller)	N1/SELLER	LOOP_N1
2	N1		(623) (635)	Name	LOOP_N1@N1
3	N101/98		"SE"	Entity ID	LOOP_N1@N1@98
3	N102/93		y.name	Name	LOOP_N1@N1@93
2	N4			Geographic Location	LOOP_N1@N4
3	N402/156		y.addr	State	LOOP_N1@N4@156
1 (625)	LOOP_PO1	*	z:=row(lineitem,poid,in0)	PO1/Line ItemInfo	LOOP_PO1
2	PO1		(640)	Base Line Item	LOOP_PO1@PO1
3	PO101/350		z.prodid	ID	LOOP_PO1@PO1@350
3	PO102/330		"1" (642)	Quantity	LOOP_PO1@PO1@330
3	PO104/212		z.amount	Unit Price	LOOP_PO1@PO1@212
2 (627)	LOOP_PID	*	w:=row(product,prodid,z.prodid)	PID/Descriptions	LOOP_PO1@LOOP_PID
3	PID		(643) (644)	Product/Item Description	LOOP_PO1@LOOP_PID@PID
4	PID01/349		"F"	Item Description Type	LOOP_PO1@LOOP_PID@PID@349
4	PID05/352		w.name	Description	LOOP_PO1@LOOP_PID@PID@352

(428)

FIG. 6

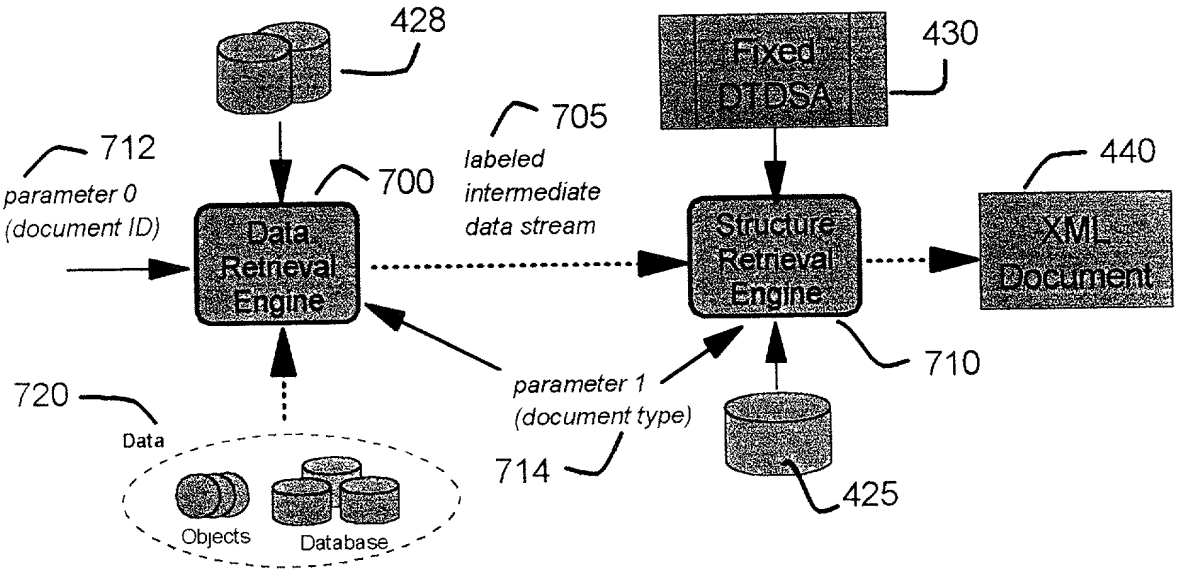

428
Fixed RTDSA
430
712
parameter 0
(document ID)
700
705
labeled
intermediate
data stream
440
Data Retrieval Engine
Structure Retrieval Engine
XML Document
710
720
Data
parameter 1
(document type)
714
425
Objects
Database

FIG. 7A

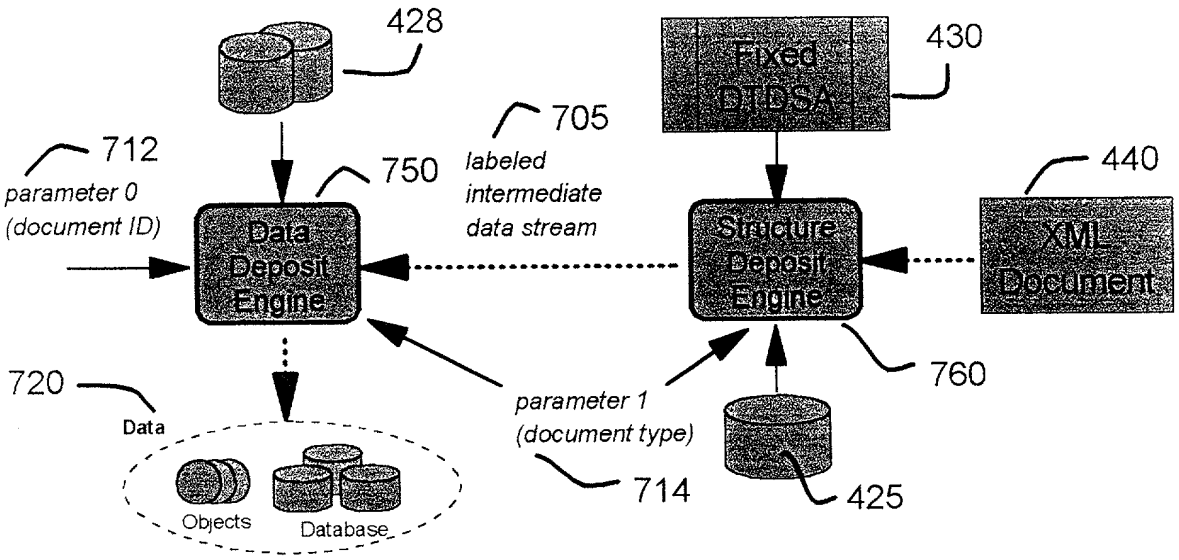


FIG. 7B

Sep 30, 2004 Sheet 7 of 24

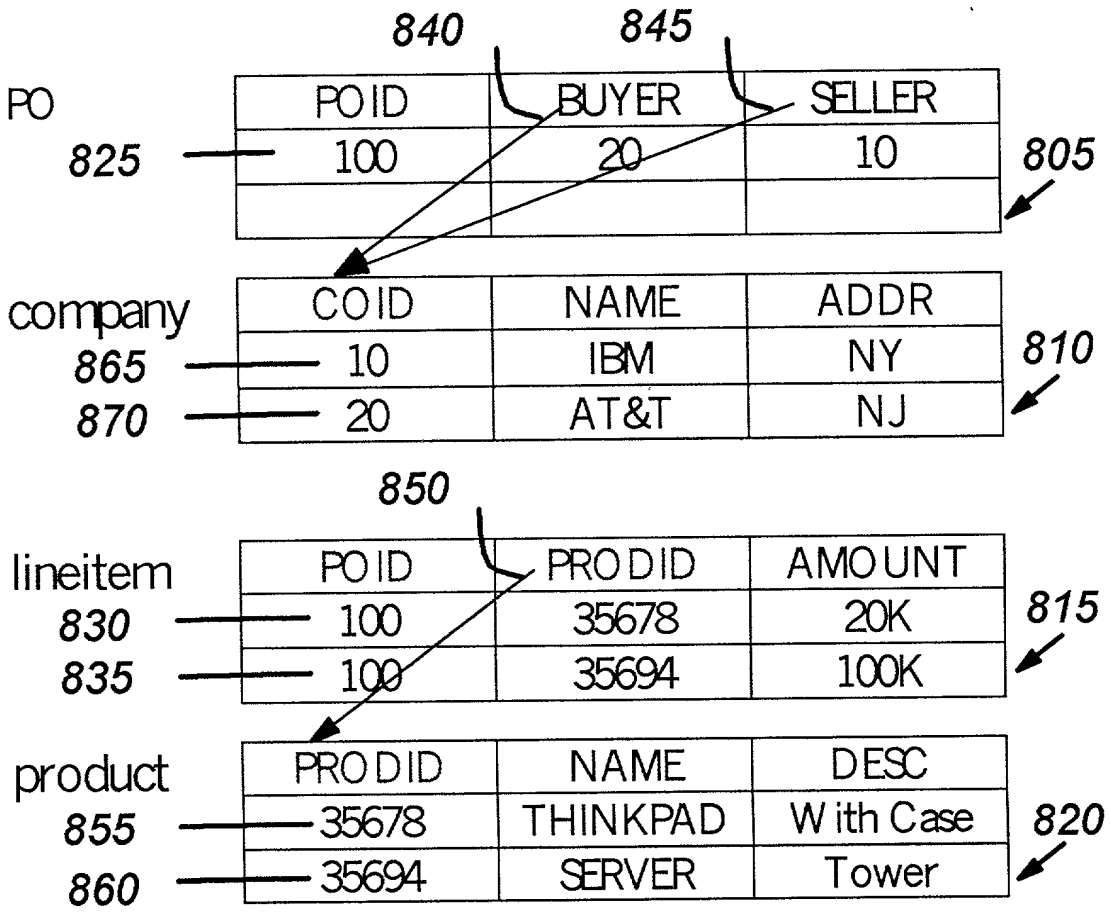

840
845
PO
POID
BUYER
SELLER
825
100
20
10
805
company
COID
NAME
ADDR
865
10
IBM
NY
870
20
AT&T
NJ
810
850
lineitem
POID
PRODID
AMOUNT
830
100
35678
20K
835
100
35694
100K
815
product
PRODID
NAME
DESC
855
35678
THINKPAD
With Case
860
35694
SERVER
Tower
820

FIG. 8A

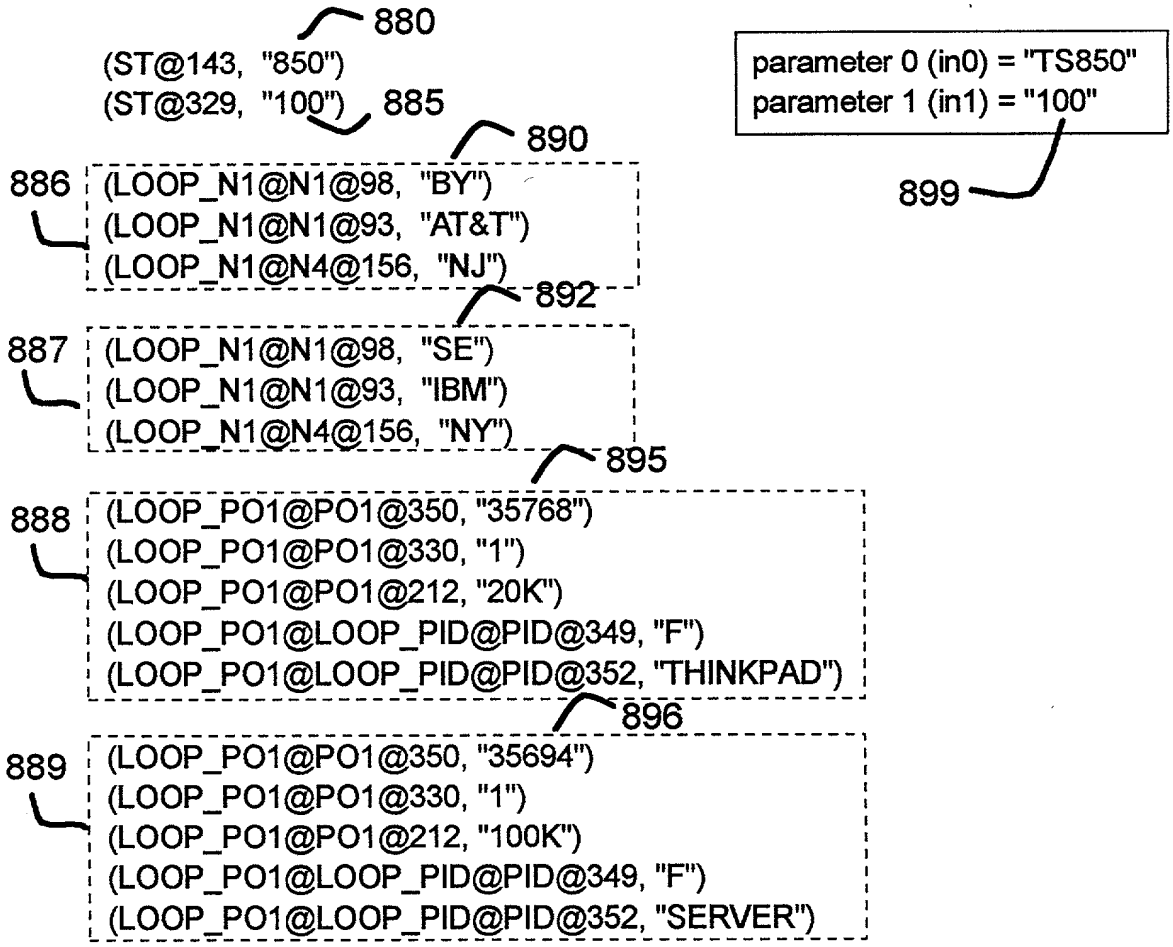

880
(ST@143, "850")
(ST@329, "100")
885
parameter 0 (in0) = "TS850"
parameter 1 (in1) = "100"
899
890
886
(LOOP_N1@N1@98, "BY")
(LOOP_N1@N1@93, "AT&T")
(LOOP_N1@N4@156, "NJ")
892
887
(LOOP_N1@N1@98, "SE")
(LOOP_N1@N1@93, "IBM")
(LOOP_N1@N4@156, "NY")
895
888
(LOOP_PO1@PO1@350, "35768")
(LOOP_PO1@PO1@330, "1")
(LOOP_PO1@PO1@212, "20K")
(LOOP_PO1@LOOP_PID@PID@349, "F")
(LOOP_PO1@LOOP_PID@PID@352, "THINKPAD")
896
889
(LOOP_PO1@PO1@350, "35694")
(LOOP_PO1@PO1@330, "1")
(LOOP_PO1@PO1@212, "100K")
(LOOP_PO1@LOOP_PID@PID@349, "F")
(LOOP_PO1@LOOP_PID@PID@352, "SERVER")

FIG. 8B

```
<transactionSet code='850' version='004010' standard='X12'>
<name>Purchase Order</name>

<segment code='ST'>
    for header
</segment>                    800
<loop code='N1'>
    for buyer
</loop>                       802
<loop code='N1'>
    for seller
</loop>                       804
<loop code='PO1'>
    first line item
</loop>                       806
<loop code='PO1'>
    second line item
</loop>                       808
</transactionSet>
```

FIG. 8C

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```
<segment code='ST'>
    <name>Transaction Set Header</name>
    <element code='143'>
        <name>ID Code</name>
        <value code='850'>X12 Purchase Order</value>
    </element>
    <element code='329'>
        <name>Control Number</name>
        <value>100</value>
    </element>
</segment>
```

650
651
652
899
800

FIG. 9A

```
<loop code='N1'>
    <segment code='N1'>
        <name>Name</name>
        <element code='98'>
            <name>Entity ID</name>                    912
            <value code='BY'>Buying Party</value>
        </element>                                    910
        <element code='93'>
            <name>Name</name>
            <value>AT&T</value>
        </element>
    </segment>
    <segment code='N4'>
        <name>Geographic Location</name>
        <element code='156'>
            <name>State</name>
            <value>NJ</value>
        </element>
    </segment>
</loop>
```

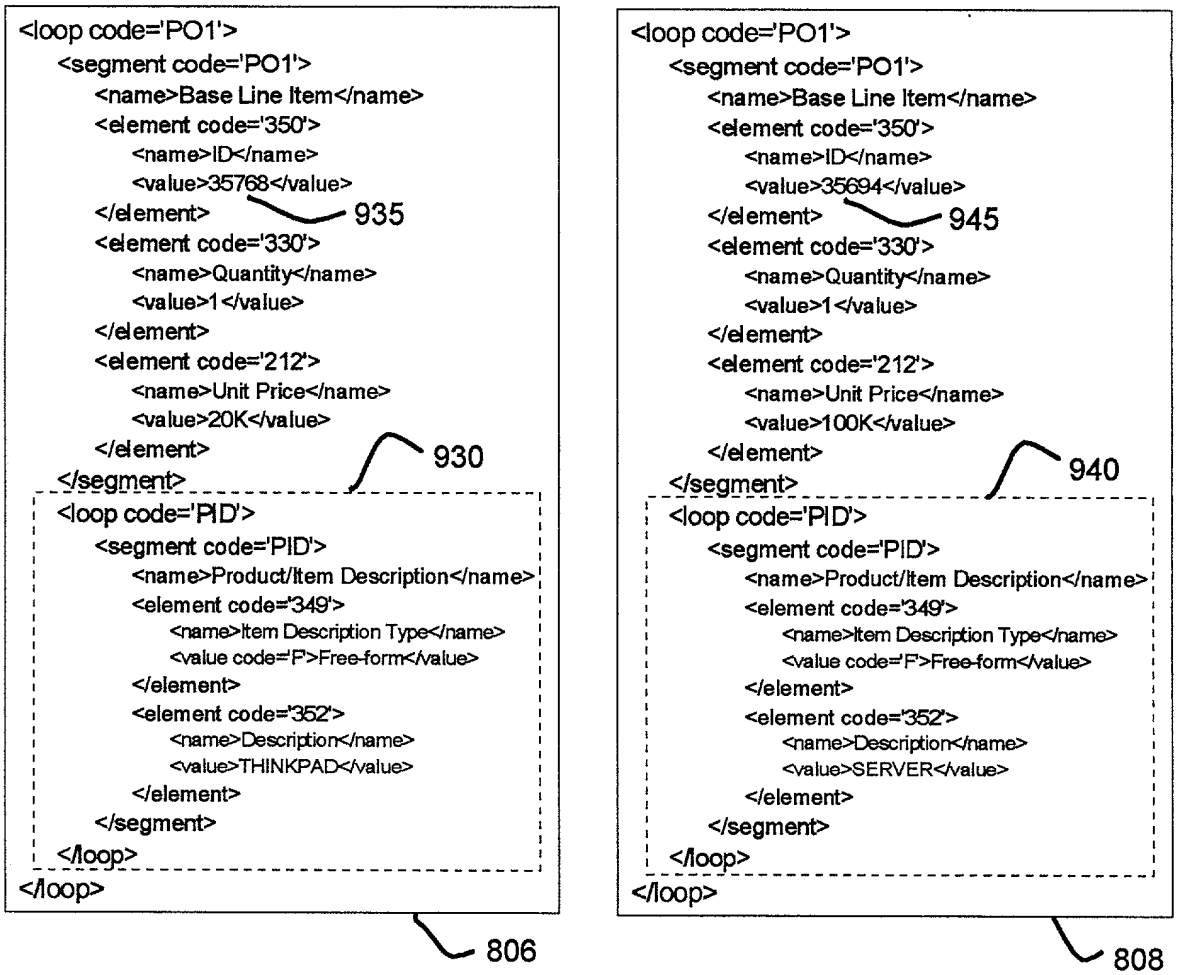
802

```
<loop code='N1'>
    <segment code='N1'>
        <name>Name</name>
        <element code='98'>
            <name>Entity ID</name>                    922
            <value code='SE'>Selling Party</value>
        </element>                                    920
        <element code='93'>
            <name>Name</name>
            <value>IBM</value>
        </element>
    </segment>
    <segment code='N4'>
        <name>Geographic Location</name>
        <element code='156'>
            <name>State</name>
            <value>NY</value>
        </element>
    </segment>
</loop>
```

804

FIG. 9B

Oracle-Exhibit 1008


<loop code='PO1'>

<name>Base Line Item</name>
<element code='350'>
<name>ID</name>
<value>35768</value>
</element>
935
<element code='330'>
<name>Quantity</name>
<value>1</value>
</element>
<element code='212'>
<name>Unit Price</name>
<value>20K</value>
</element>
930

<loop code='PID'>

<name>Product/Item Description</name>
<element code='349'>
<name>Item Description Type</name>
<value code='F'>Free-form</value>
</element>
<element code='352'>
<name>Description</name>
<value>THINKPAD</value>
</element>

</loop>
</loop>
806
<loop code='PO1'>

<name>Base Line Item</name>
<element code='350'>
<name>ID</name>
<value>35694</value>
</element>
945
<element code='330'>
<name>Quantity</name>
<value>1</value>
</element>
<element code='212'>
<name>Unit Price</name>
<value>100K</value>
</element>
940

<loop code='PID'>

<name>Product/Item Description</name>
<element code='349'>
<name>Item Description Type</name>
<value code='F'>Free-form</value>
</element>
<element code='352'>
<name>Description</name>
<value>SERVER</value>
</element>

</loop>
</loop>
808

FIG. 9C

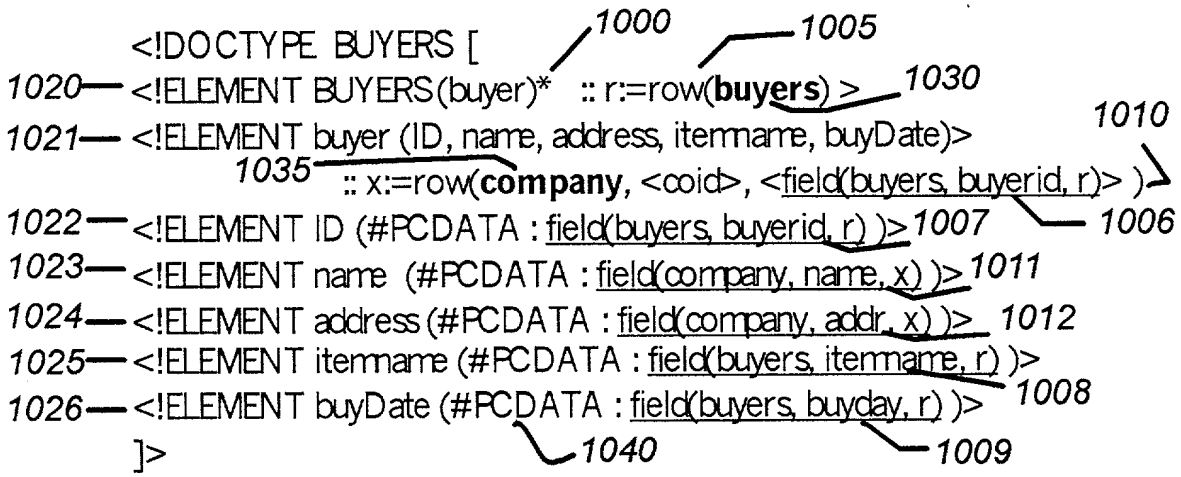

<!DOCTYPE BUYERS [
<!ELEMENT BUYERS(buyer)* :: r:=row(buyers) >
<!ELEMENT buyer (ID, name, address, itemname, buyDate)>
:: x:=row(company, <coid>, <field(buyers, buyerid, r)>)
<!ELEMENT ID (#PCDATA : field(buyers, buyerid, r))>
<!ELEMENT name (#PCDATA : field(company, name, x))>
<!ELEMENT address (#PCDATA : field(company, addr, x))>
<!ELEMENT itemname (#PCDATA : field(buyers, itemname, r))>
<!ELEMENT buyDate (#PCDATA : field(buyers, buyday, r))>
]>
1000
1005
1020
1030
1021
1010
1035
1022
1007
1006
1023
1011
1024
1012
1025
1008
1026
1040
1009

FIG. 10A

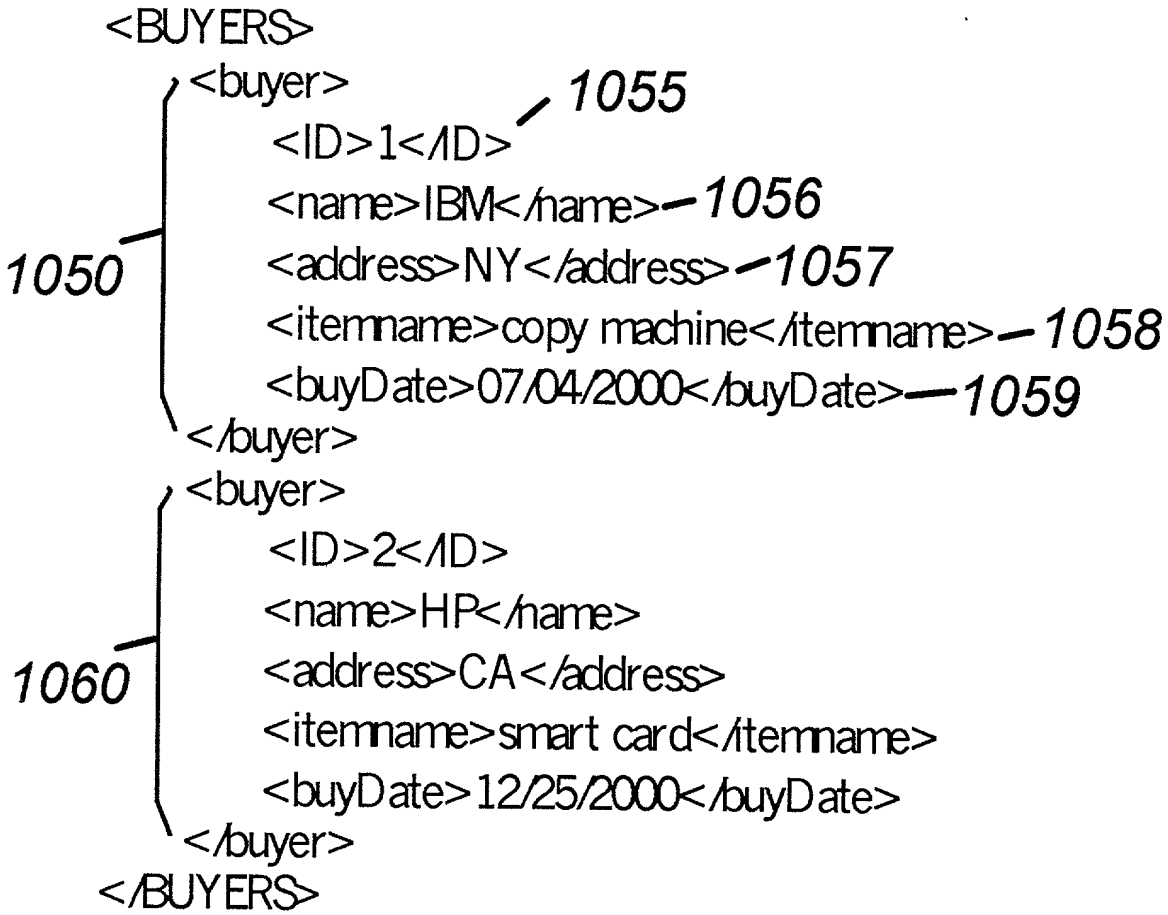


FIG. 10B

Document ID: US 6,704,906 B1

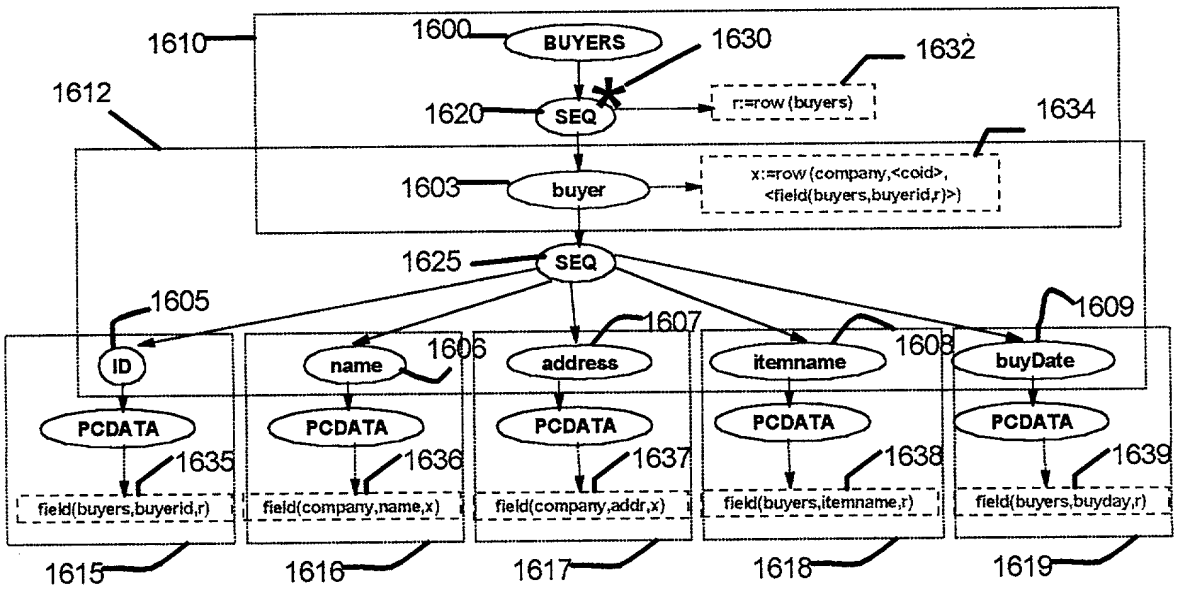

1610
1600
BUYERS
1630
1632
1612
1620
SEQ
r:=row (buyers)
1634
x:=row (company,<coid>,
<field(buyers,buyerid,r)>)
1603
buyer
1625
SEQ
1605
1607
1609
ID
name
1606
address
itemname
1608
buyDate
PCDATA
PCDATA
PCDATA
PCDATA
PCDATA
1635
1636
1637
1638
1639
field(buyers,buyerid,r)
field(company,name,x)
field(company,addr,x)
field(buyers,itemname,r)
field(buyers,buyday,r)
1615
1616
1617
1618
1619

FIG. 11A

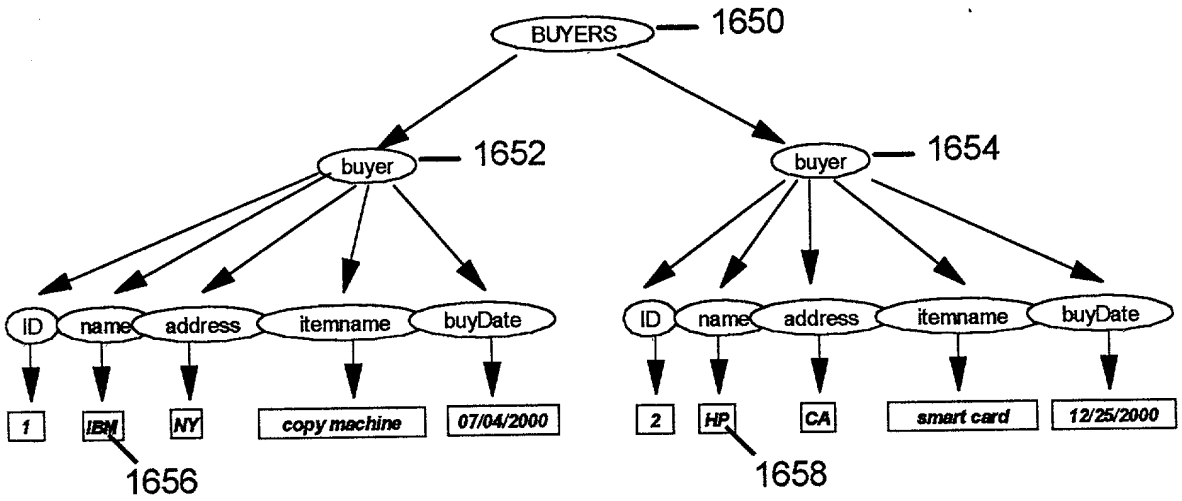

BUYERS
1650
buyer
1652
buyer
1654
ID
name
address
itemname
buyDate
ID
name
address
itemname
buyDate
1
IBM
NY
copy machine
07/04/2000
2
HP
CA
smart card
12/25/2000
1656
1658

FIG. 11B

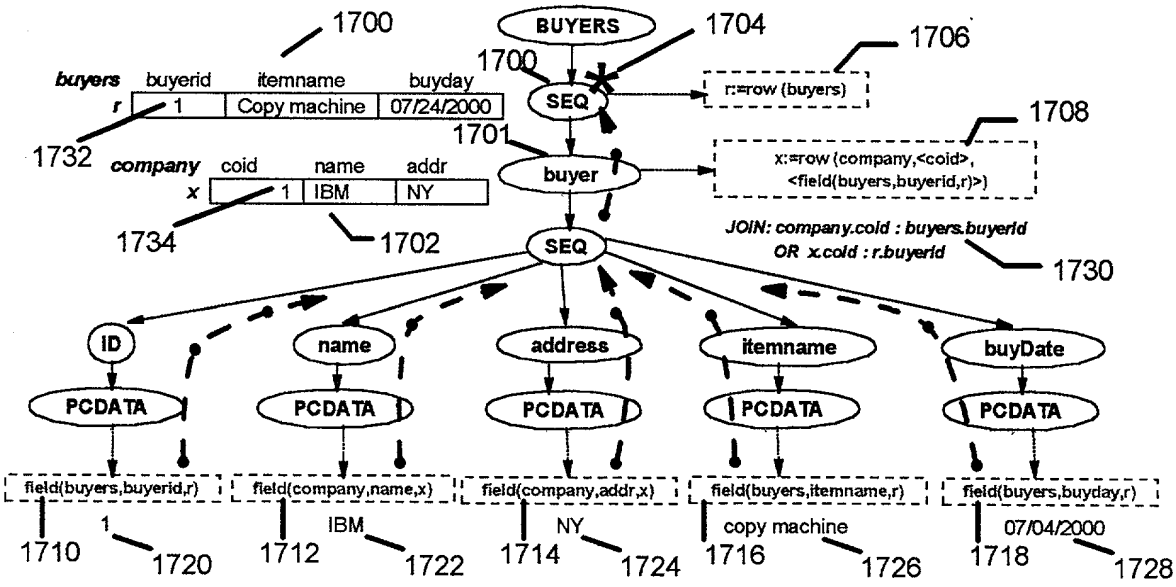

1700
BUYERS
1704
1706
1700
buyers buyerid itemname buyday
r 1 Copy machine 07/24/2000
SEQ
r:=row (buyers)
1708
1701
1732
company coid name addr
x 1 IBM NY
buyer
x:=row (company,<coid>,
<field(buyers,buyerid,r)>)
1734
1702
JOIN: company.coid : buyers.buyerid
OR x.coid : r.buyerid
SEQ
1730
ID
name
address
itemname
buyDate
PCDATA
PCDATA
PCDATA
PCDATA
PCDATA
field(buyers,buyerid,r)
field(company,name,x)
field(company,addr,x)
field(buyers,itemname,r)
field(buyers,buyday,r)
1
IBM
NY
copy machine
07/04/2000
1710
1720
1712
1722
1714
1724
1716
1726
1718
1728

FIG. 12A

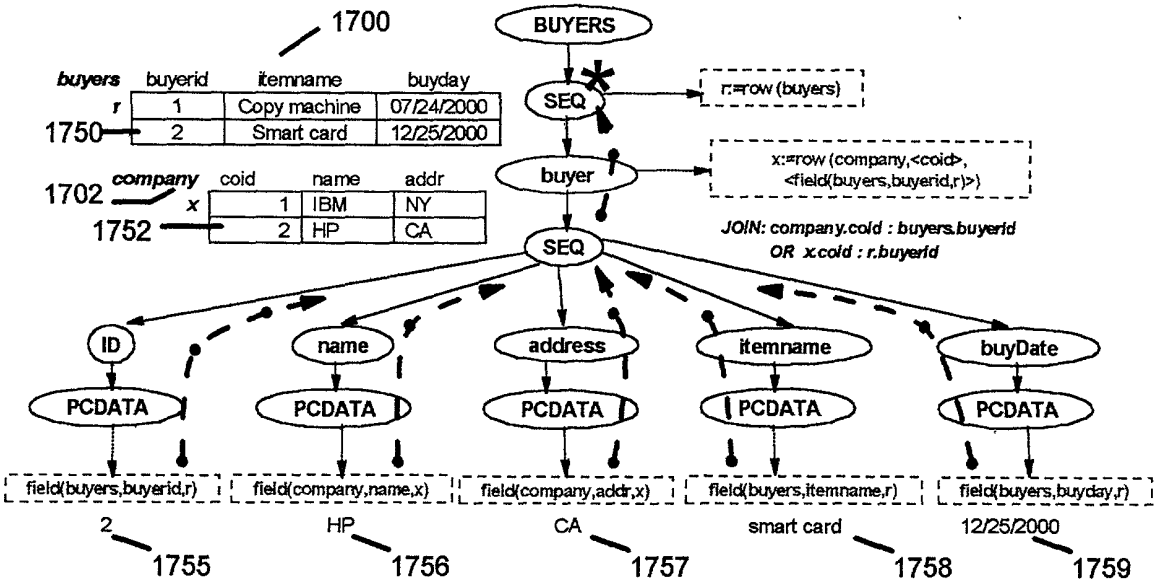

1700
buyers
buyerid
itemname
buyday
r
1
Copy machine
07/24/2000
1750
2
Smart card
12/25/2000
company
coid
name
addr
1702
x
1
IBM
NY
1752
2
HP
CA
BUYERS
SEQ
r:=row (buyers)
buyer
x:=row (company,<coid>,
<field(buyers,buyerid,r)>)
JOIN: company.coid : buyers.buyerid
OR x.coid : r.buyerid
SEQ
ID
name
address
itemname
buyDate
PCDATA
PCDATA
PCDATA
PCDATA
PCDATA
field(buyers,buyerid,r)
field(company,name,x)
field(company,addr,x)
field(buyers,itemname,r)
field(buyers,buyday,r)
2
HP
CA
smart card
12/25/2000
1755
1756
1757
1758
1759

FIG. 12B

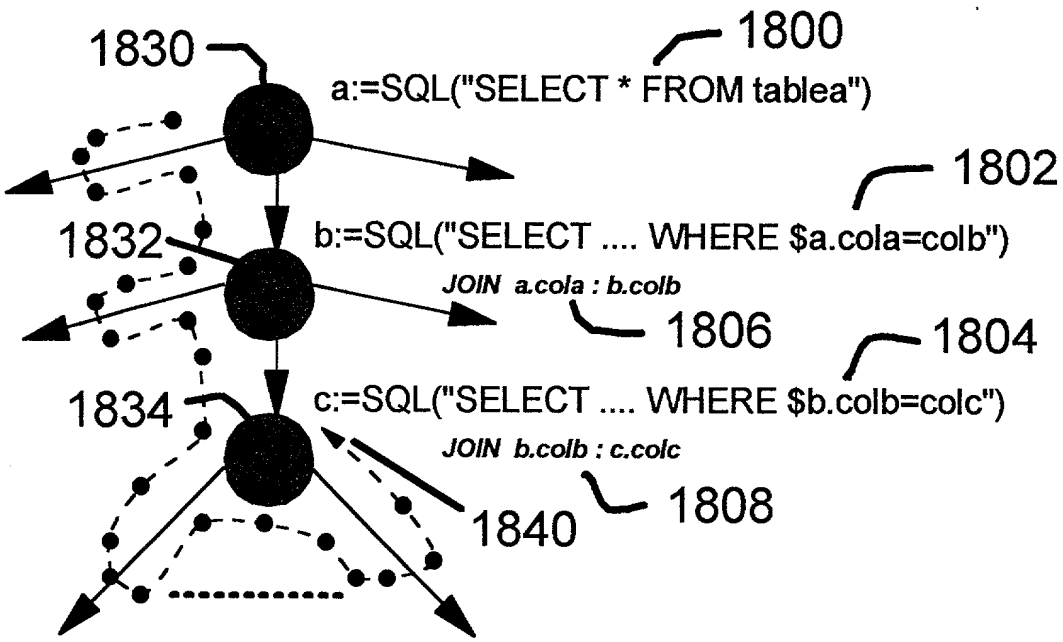

1830
1800
a:=SQL("SELECT * FROM tablea")
1802
1832
b:=SQL("SELECT .... WHERE $a.cola=colb")
JOIN a.cola : b.colb
1806
1804
1834
c:=SQL("SELECT .... WHERE $b.colb=colc")
JOIN b.colb : c.colc
1840
1808

FIG. 13

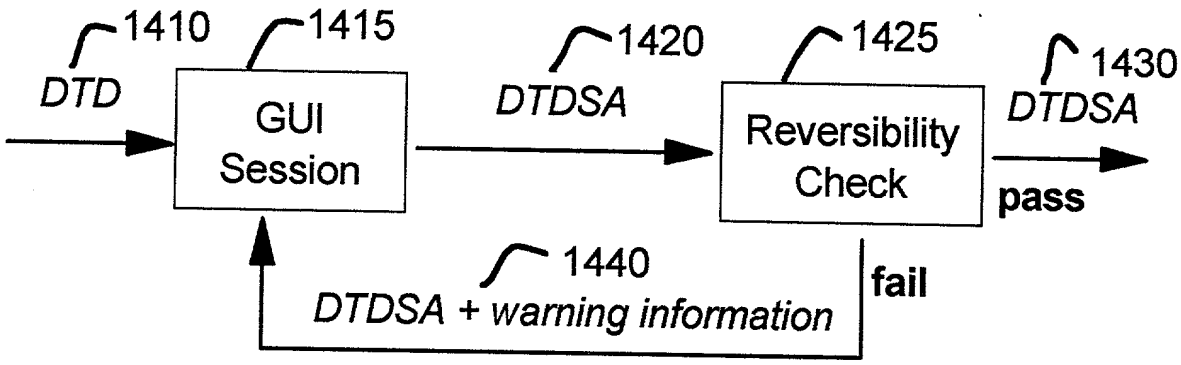


FIG. 14

Docket No. 2004P03501US